

METHOD AND APPARATUS FOR PROVIDING MEDICAMENT TO TISSUE

ABSTRACT

A system for delivering medicaments to tissue includes a tissue-removal and medicament-delivery device. The device includes a delivery member and an optical fiber formed together into a unitary structure by cladding. The optical fiber has an inlet for receiving laser energy from a laser energy source and an outlet for emitting laser energy. The delivery member has an inlet for receiving medicament from a medicament source and an outlet for injecting medicament. A handpiece is adapted to receive the ablating and injecting device in a controlled and movable relationship. The distal end of the handpiece disposes at least one tissue stabilizing member thereon. For example, in one embodiment the tissue stabilizing member comprises deployable needles or barbs which engage the tissue positioned proximate thereto, thereby securely positioning the device. In another embodiment, the tissue stabilizer comprises vacuum ports in communication with an external vacuum source. Alternatively, the tissue stabilizer may further comprise at least one inflatable balloon which engages the tissue disposed proximate thereto. In use, a distal end of the handpiece is placed against tissue to be ablated. The ablating and injecting device is advanced beyond the distal end of the handpiece and into the tissue while emitting laser energy from the optical fiber. The emitted laser energy ablates the tissue as the optical fiber advances. The ablating and injecting device is then retracted from the tissue, thereby resulting in a channel formed in the tissue. While the device retracts, medicament is injected from the delivery member into the channel, thereby providing a plug within the channel. Alternatively, medicament may be injected into the tissue surrounding the channel by delivering the medicament into the tissue surrounding the channel opening or delivering it directly into the channel wall. IN an additional embodiment, sealing balloons may be used to increase the retention of the medicament within the tissue and prevent medicament washout. The medicament may include growth factor combined with a cellular matrix which enhances angiogenesis in the tissue or may include a gene that encodes for said growth factor, or any other therapeutic agent or gene therapy agent that promotes angiogenesis or any therapeutic agent for the treatment of

cardiovascular disease. The medicament delivery system is particularly useful in cardiac applications for performing transmyocardial revascularization (TMR) in ischemic myocardium and promoting endothelial cell growth within the myocardium.

FOR FURTHER INFORMATION